

What is claimed is:

1. An active ray curable ink-jet ink composition comprising:
 - a photo-induced acid generating agent containing an onium salt which does not generate benzene during active ray radiation,
 - and
 - a photopolymerizable compound containing a compound having an oxetane ring in the molecule.
2. The active ray curable ink-jet ink composition according to claim 1, wherein the onium salt is a sulfonium salt.
3. The active ray curable ink-jet ink composition according to claim 1, wherein the onium salt is an iodonium salt.
4. An active ray curable ink-jet ink composition comprising:

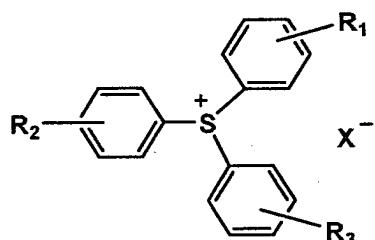
a photo-induced acid generating agent containing an onium salt which does not generate benzene during active ray radiation,

and

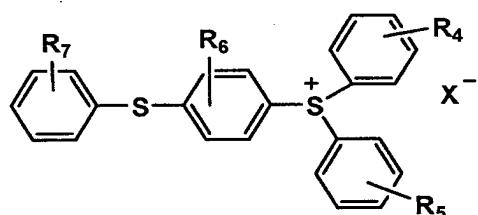
a photopolymerizable compound containing a compound having an oxetane ring in the molecule,

wherein the onium salt is a sulfonium salt represented by one of Formulas (1) to (4):

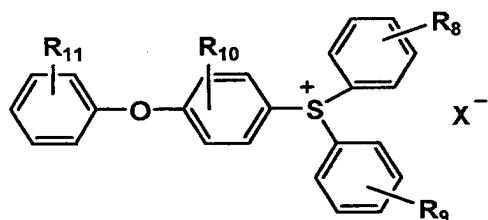
Formula (1)



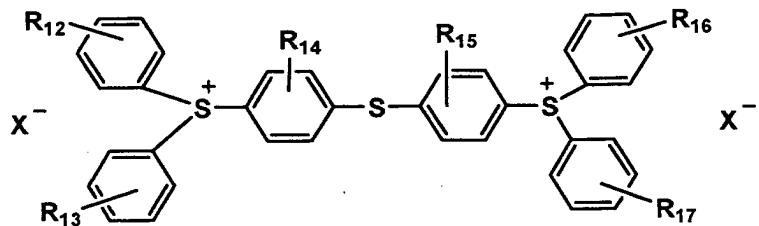
Formula (2)



Formula (3)



Formula (4)

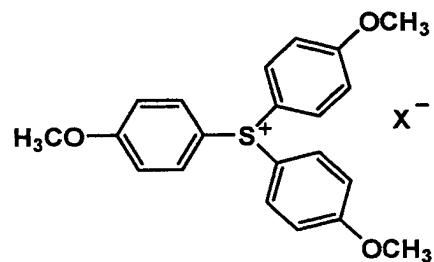


wherein $R_1 - R_{17}$ are each a hydrogen atom or a substituent group, provided that $R_1 - R_3$ are not a hydrogen atom at the same time, $R_4 - R_7$ are not a hydrogen atom at the same time, $R_8 - R_{11}$ are not a hydrogen atom at the same time, $R_{12} - R_{17}$ are not a hydrogen atom at the same time; X is a non-nucleophilic anion residue; and $R_1 - R_3$ of Formula (1) are not a phenylthio group or a phenoxy group.

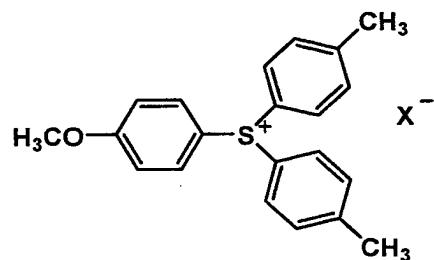
5. The active ray curable ink-jet ink composition according to claim 4,

wherein the sulfonium salt represented by one of Formulas (1) - (4) is represented by one of Formulas (5) - (13):

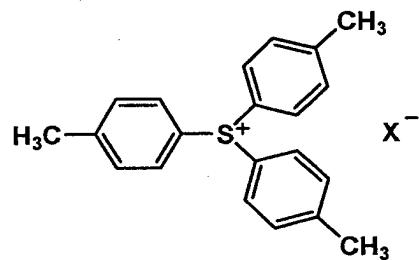
Formula (5)



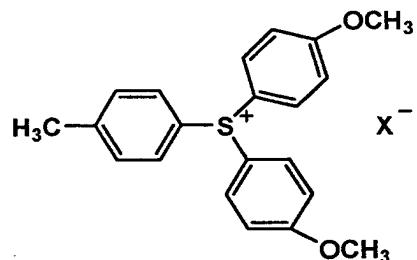
Formula (6)



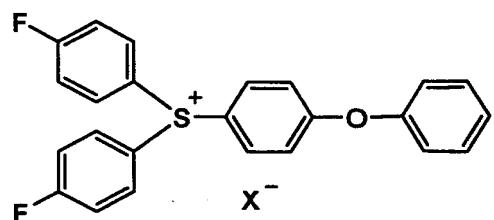
Formula (7)



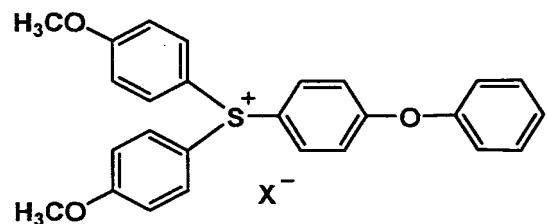
Formula (8)



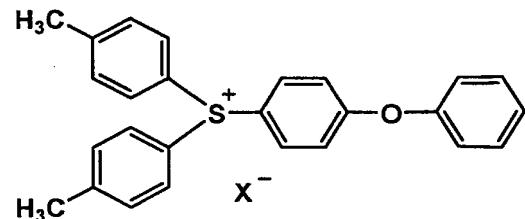
Formula (9)



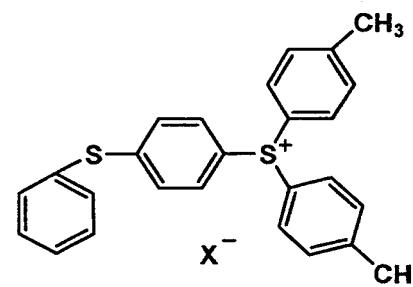
Formula (10)



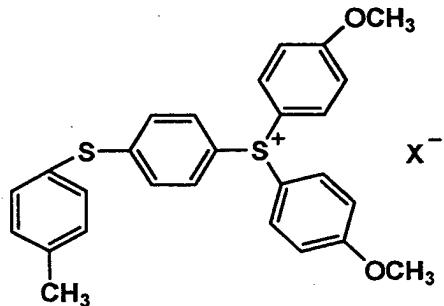
Formula (11)



Formula (12)



Formula (13)



wherein X in each Formula is a non-nucleophilic anionic group.

6. The active ray curable ink-jet ink composition according to claim 1, comprising a basic compound.

7. The active ray curable ink-jet ink composition according to claim 1, comprising a nonionic surface active agent.

8. The active ray curable ink-jet ink composition according to claim 1, comprising a photopolymerizable compound having an oxirane group in the molecule.

9. The active ray curable ink-jet ink composition according to claim 1, comprising the following photopolymerizable compounds:

(a) a compound having at least one oxetane ring in the molecule in an amount of 25 - 90 weight%;

(b) a compound having at least one oxirane group in the molecule in an amount of 10 - 70 weight%; and

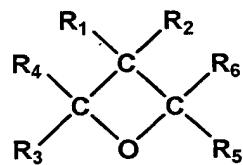
(c) a vinyl ether compound in an amount of 0 - 40 weight%,

each weight% is based on the total weight of the composition.

10. The active ray curable ink-jet ink composition according to claim 1,

wherein the compound which has an oxetane ring is represented by Formula (E):

Formula (E)



Wherein R₁ - R₆ are each a hydrogen atom or a substituent group, provided that at least one group represented by R₃ - R₆ is a substituent group.

11. The active ray curable ink-jet ink composition according to claim 1 exhibits a viscosity of 7 - 50 mPa·s at 25 °C.

12. An image forming method using the active ray-curable ink-jet ink composition of Claim 1, comprising the steps of:

(a) ejecting droplets of the ink from a nozzle of an ink-jet recording head to form an image on a recording material; and

(b) irradiating the image with an active ray, wherein the irradiation step is carried out between 0.001 - 2.0 seconds after deposition of the ink composition.

13. The image forming method according to claim 12, wherein the total ink thickness on the recording material is 2 - 20 µm after irradiation of an active ray.

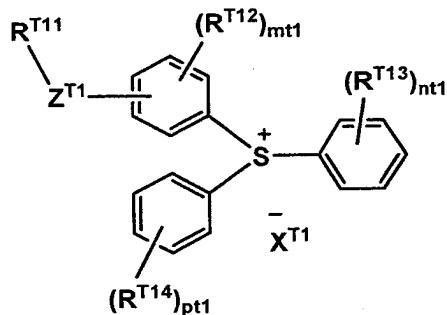
14. The image forming method according to claim 12, wherein the ink droplet volume ejected from each nozzle of the ink-jet recording head is 2 to 15 pl.

15. The image forming method according to claim 12,
wherein the ink-jet recording head is a line head.

16. An ink-jet recording apparatus which is employed
in the image forming method according to claim 12,
wherein an active ray curable ink-jet ink composition
and an ink-jet recording head are heated to 35 - 100 °C
before ejecting the ink composition.

17. A triarylsulfonium salt comprising a compound
represented by Formula (T-1) :

Formula (T-1)

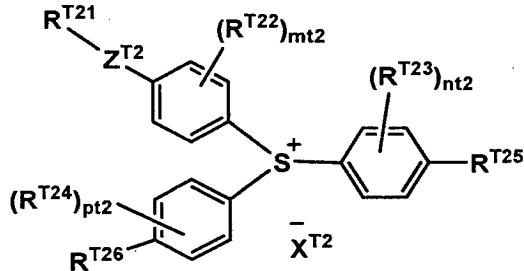


wherein R^{T11} and R^{T12} are an alkyl group or an aromatic group; Z^{T1} is an oxygen atom or a sulfur atom; R^{T13} and R^{T14} are each an alkyl group, an aromatic group, an alkoxy group, an aryloxy group, an alkylthio group or an arylthio group;

mt1 is an integer of 0 - 4; nt1 and pt1 are each an integer of 1 - 5; and X^{T1} is PF₆.

18. The triarylsulfonium salt compound represented by Formula (T-1) according to claim 17, is a compound represented by Formula (T-2) :

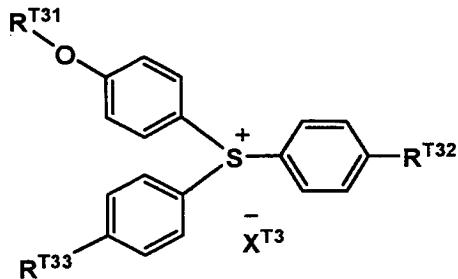
Formula (T-2)



wherein, R^{T21}, R^{T22}, R^{T23} and R^{T24} are each an alkyl group or an aromatic group; Z^{T2} is an oxygen atom or a sulfur atom; R^{T25} and R^{T26} are each an alkyl group, a hydrocarbon fluoride group, an aromatic group, an alkoxy group, an aryloxy group, an alkylthio group or an arylthio group; mt2, nt2 and pt2 are each an integer of 0 - 4; and X^{T2} is PF₆.

19. The triarylsulfonium salt compound represented by Formula (T-2) according to claim 18, is a compound represented by Formula (T-3) :

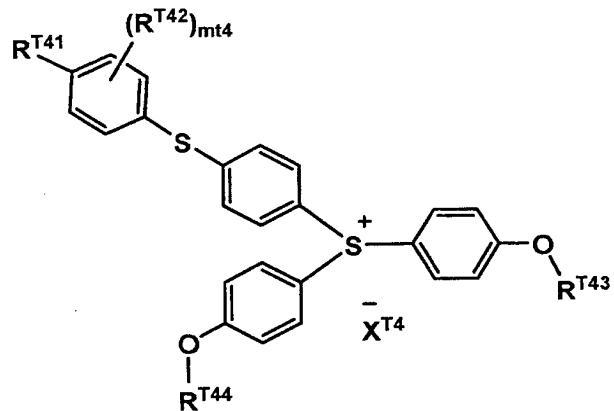
Formula (T-3)



wherein R^{T31} is an alkyl group of 1 - 10 carbon atoms; R^{T32} and R^{T33} are each an alkyl group of 1 - 10 carbon atoms or an alkoxy group of 1 - 10 carbon atoms; and X^{T3} is PF₆.

20. The triarylsulfonium salt compound represented by Formula (T-2) according to claim 18, is a compound represented by Formula (T-4) :

Formula (T-4)

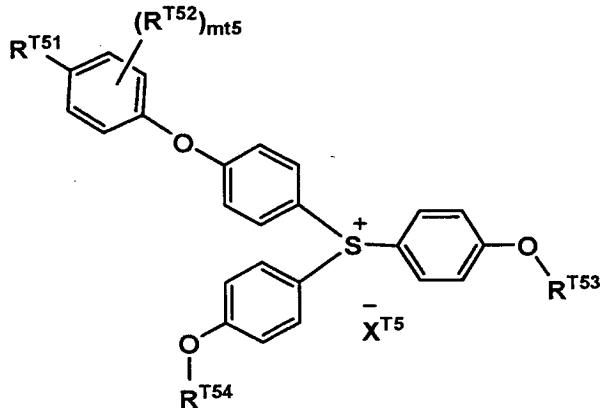


wherein R^{T41} is a hydrogen atom or an alkyl group of 1 - 10 carbon atoms, R^{T42} is a substituent group, mt4 is an

integer of 0 - 4, R^{T43} and R^{T44} are each an alkyl group of 1 - 10 carbon atoms, and X^{T4} is PF_6^- .

21. The triarylsulfonium salt compound represented by Formula (T-2) according to claim 18, is a compound represented by Formula (T-5) :

Formula (T-5)



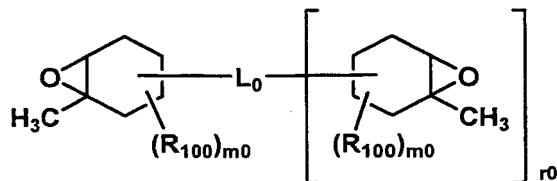
wherein R^{T51} is a hydrogen atom or an alkyl group of 1 - 10 carbon atoms, R^{T52} is a substituent group, mt5 is an integer of 0 - 4, R^{T53} and R^{T54} are each an alkyl group of 1 - 10 carbon atoms, and X^{T5} is PF_6^- .

22. An active ray curable composition comprising:

- (a) a triarylsulfonium compound described in claim 17;
- and
- (b) an epoxy compound.

23. The active ray curable composition according to claim 22, wherein the epoxy compound is an alicyclic epoxy compound represented by Formula (A) :

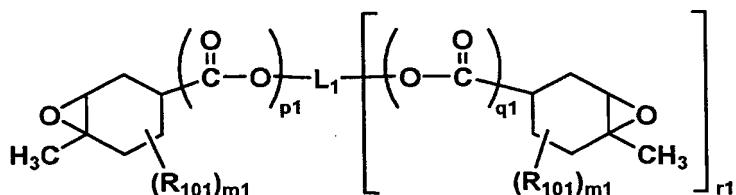
Formula (A)



wherein R₁₀₀ is a substituent group; m_0 is an integer of 0 - 2; r_0 is an integer of 1 - 3; L₀ is a r_0+1 valent linking group of 1 - 15 carbon atoms, which may contain an oxygen atom or a sulfur atom in the principal chain, or a single bond.

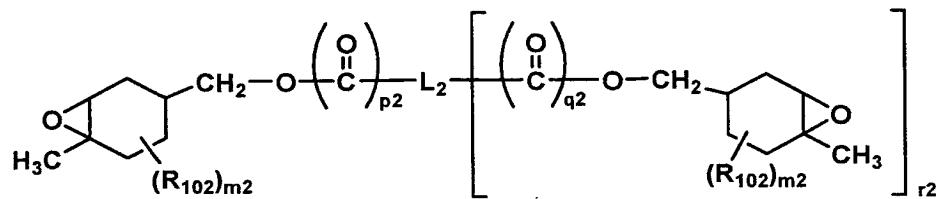
24. The active ray curable composition according to claim 22, wherein the epoxy compound is one selected from the alicyclic compounds represented by one of Formulas (I) - (VI) :

Formula (I)



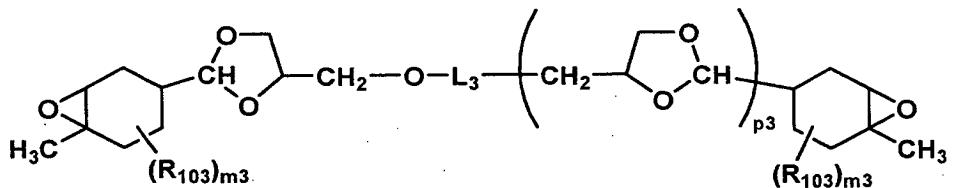
wherein R_{101} is a substituent group, m_1 is an integer of 0 - 2, p_1 and q_1 are each 0 or 1, r_1 is an integer of 1 - 3, and L_1 is a r_1+1 valent linking group of 1 - 15 carbon atoms, which may contain an oxygen atom or a sulfur atom in the principal chain, or a single bond;

Formula (II)



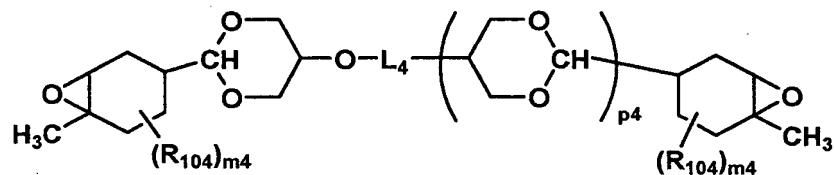
wherein R_{102} is a substituent group, m_2 is an integer of 0 - 2, p_2 and q_2 are each 0 or 1, L_2 is a r_2+1 valent linking group of 1 - 15 carbon atoms, which may contain an oxygen atom or a sulfur atom in the principal chain, or a single bond;

Formula (III)



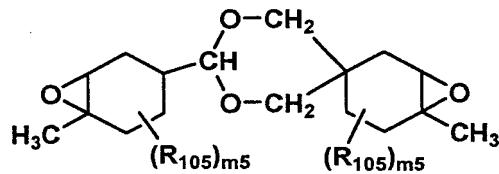
wherein R_{103} is a substituent group, m_3 is an integer of 0 - 2, p_3 is 0 or 1, L_3 is a divalent linking group of 1 - 8 carbon atoms, which may contain an oxygen atom or a sulfur atom in the principal chain, or a single bond;

Formula (IV)



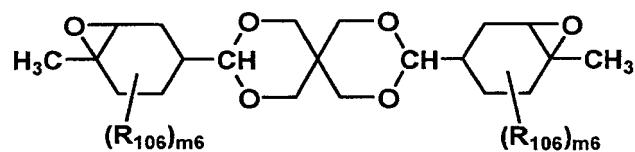
wherein R_{104} is a substituent group, $m4$ is an integer of 0 - 2, $p4$ is 0 or 1, L_4 is a divalent linking group of 1 - 8 carbon atoms, which may contain an oxygen atom or a sulfur atom in the principal chain, or a single bond;

Formula (V)



wherein R_{105} is a substituent group, and $m5$ is 1 or 2; and

Formula (VI)



wherein R_{106} is a substituent group, and $m6$ is an integer of 0 - 2.

25. An active ray curable ink-jet ink composition containing the active ray curable composition according to claim 22.